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Method and device for cooling vapor in
a desorption column

Specification:

The invention relates to a method for cooling rising vapors in a desorption column by means of a condenser disposed at the head of the desorption column, configured as an indirect heat exchanger, through which a coolant flows, whereby the coolant enters into the condenser at the bottom and flows upward through vertical channels disposed in the condenser.

The head of a desorption column is usually equipped with a condenser that is operated with cooling water and is configured as an indirect heat exchanger. In the operation of an indirect heat exchanger, there is no direct contact between the fluid that absorbs the heat and the fluid that gives off the heat, since the fluids are separated from one another by means of flow guide elements, and the heat transport takes place through the flow guide elements. In the case of a load change of the desorption column, there is the risk that the cooling water temperature changes and that carbonate precipitation occurs. This is particularly the case if the cooling water temperature required for the desired operating state of the desorption column is high

at the exit of the condenser. Carbonate precipitation at the heat transfer surfaces increasingly worsens the heat transfer behavior in the condenser and, in the final analysis, results in failure of the apparatus. This problem is circumvented in that the vapors are cooled by means of a direct heat exchange, e.g. sprinkling of the column head with cooling water. However, this direct heat exchange is difficult to regulate, because the cooling surface is not defined.

The invention is based on the task of indicating a method having the characteristics described initially, in which no carbonate precipitation occurs at the heat exchanger surfaces impacted by the cooling water, independent of the operating state of the desorption column. Furthermore, a good regulation possibility should exist in case of a load change.

According to the invention, this task is accomplished in that a coolant containing hydrogen sulfide is used, and that the coolant exits as an overflow, by means of top-side openings of the channels, at the top of the condenser, after the heat absorption has occurred. The cooling surface of the condenser is predetermined by the heat exchanger surfaces. In the case of a load change of the desorption column, the temperature of the cooling

surfaces can be adjusted very simply and precisely, by means of the cooling water amount. In this connection, deposition of carbonates on the heat exchanger surfaces can be effectively prevented by means of conducting the method in accordance with the invention, with the use of a coolant that contains hydrogen sulfide.

According to a preferred embodiment of the method according to the invention, the overflow flows into the desorption column. By means of applying a cooling water that contains hydrogen sulfide into the desorption column, the hydrogen sulfide is directly separated from the cooling water again after the heat transfer, since the hydrogen sulfide, which has a very low boiling point, leaves the desorption column at the head, together with the cooled vapors, while the water, which has a clearly lower boiling point, flows into the sump of the desorption column. Thus, no additional process step is necessary to remove the hydrogen sulfide from the cooling water again.

The object of the invention is also a desorption column according to claim 3, to implement the method.

In the following, the invention will be explained in detail, using a drawing that represents an embodiment merely as an example. The drawing shows:

Fig. 1 a schematic representation of a condenser disposed at the head of a desorption column, and

Fig. 2 a detailed representation of the condenser shown in Fig. 1.

Fig. 1 shows a condenser 1 that is disposed at the head of a desorption column 2. Vapors 3 rise from the desorption column, and are cooled by means of the condenser. The vapors 3 enter into the condenser 1 at the bottom. The non-condensing gases 4 that are cooled at heat exchanger surfaces of the condenser exit at the top of the condenser 1 and flow further upward. The cooling water 5, which has been enriched with hydrogen sulfide, according to the invention, enters into the condenser at the bottom. During the heat absorption, the cooling water 5 flows upward in the condenser and exits at the top of the condenser as an overflow 6. The overflow 6 flows into the desorption column 2.

Fig. 2 shows the structure of the condenser 1 according to the invention. The condenser 1 has a distributor device 7 as well as channels 8 that form heat exchanger surfaces, and is disposed in the column head of the desorption column 2. The cooling water 5 can flow through the distributor device 7; the latter serves to distribute the cooling water 5 that flows into the condenser 1. The distributor device 7 is rigidly connected with the channels 8 through which the fluid flows, which channels are disposed vertically. The sections 9 between the channels 8 are selected in such a manner that the rising vapors 3 can flow around the outside surfaces of the channels 8. The channels have top openings 10 from which the coolant exits.